# Practices and Standards for Plugging Orphaned and Abandoned Hydrocarbon Wells: A Workshop

**Board on Earth Sciences and Resources**

**and the**

**Board on Infrastructure and the Constructed Environment**

*July 18th and 19th, 2024*
*National Academy of Sciences, 2101 Constitution Ave. NW, Washington, DC 20418, Room 120*

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# WORKSHOP AGENDA

National Academy of Sciences
2101 Constitution Ave. NW, Washington, DC 20418
Room 120

**Thursday, July 18, 2024**
**Times in EDT**

**9:00am** **Welcoming Remarks**

***Dr. Mary Feeley,*** *Chief Geoscientist, Exxon Mobil (retired)*

**9:15am** **Department of the Interior: Orphaned Wells Program Office Overview**

***Ms. Kimbra Davis*****,** *Director, Orphaned Wells Program Office, US Department of the Interior*

**9:30am** **Session 1: Orphaned and Abandoned Well Plugging: Costs, Challenges, and Benefits**

***Moderator: Mr. James Slutz****, Director of Study Operations, National Petroleum Council*
***Ms. Lori Wrotenbery,*** *Executive Director, Interstate Oil and Gas Compact Commission*
***Mr. Adam Peltz,*** *Director and Senior Attorney, Energy Program, Environmental Defense Fund*
***Mr. David Alleman,*** *Director, Oil and Gas Research, US Department of Energy*

**11:30am** **Working Lunch**

**12:30pm** **Compilation of State Well Plugging and Abandoning Standards and Procedures**

***Moderator: Dr. Mary Feeley****, Chief Geoscientist, Exxon Mobil (retired)*
***Mr. Rick Simmers,*** *Former Chief, Ohio Department of Natural Resources, Division of Oil and Gas Resources Management*

**1:30pm** **Session 2: Well Plugging Prioritization: Evaluating Wellbore Integrity & Subsurface Conditions**

***Moderator: Prof. Mileva Radonjic,*** *Professor & Samson Investment Chair in Petroleum Engineering*
***Mr. Dan Arthur,*** *President and Chief Engineer, ALL Consulting*
***Mr. Tom Kropatsch,*** *Oil and Gas Supervisor, Wyoming Oil and Gas Conservation Commission*
***Mr. Don Hegburg,*** *Program Manager, Office of Oil and Gas Management, Pennsylvania Department of Environmental Protection*
***Mr. Danny Sorrells,*** *Deputy Executive Director and Director, Oil and Gas Division, Railroad Commission of Texas*
***Mr. Bryan McLellan,*** *Senior Petroleum Engineer, Alaska Oil and Gas Conservation Commission*
***Mr. Matthew Warren,*** *National Oil and Gas Program Lead, Bureau of Land Management*

**3:30pm** **Break**

**3:45pm** **Session 3: Wellbore Procedures and Best Practices**

***Moderator: Prof. Nathan Meehan,*** *Professor, Harold Vance Department of Petroleum Engineering, Texas A&M University*
***Mr. Drew Hunger,*** *President, Seashore Petroleum, LLC*
***Mr. Steve Plants,*** *President of Abandonment Operations, Plants and Goodwin, Inc.*
***Mr. James Bolander,*** *President, JLB Engineering, LLC*

**5:15pm** **Day 1 Summary and Preview of Day 2**

**5:30pm** **END OF DAY 1**

**Friday, July 19, 2024**

**9:00am** **Welcoming Remarks and Recap of Day 1**

***Dr. Mary Feeley****, Chief Geoscientist, Exxon Mobil (retired)*

**9:05am** **Session 4: Environmental Risks and Monitoring**

***Moderator: Prof. Mary Kang,*** *Associate Professor, Department of Civil Engineering, McGill University*

***Ms. Sarah Busch,*** *General Engineer, Environmental Protection Agency*
***Dr. James France,*** *Senior International Methane Scientist, Environmental Defense Fund*
***Prof. Susan L. Brantley,*** *Evan Pugh University Professor, Department of Geosciences Earth and Environmental Systems Institute, The Pennsylvania State University*
***Dr. Greg Lackey,*** *Research Engineer, National Energy Technology Laboratory*
***Prof. James Saiers,*** *Clifton R. Musser Professor of Hydrology, School of the Environment, Yale University*

**11:25am** **Working Lunch**

**12:25pm** **Session 5: Reclamation and Restoration**

***Moderator: Prof. Mary Kang****, Associate Professor, Department of Civil Engineering, McGill University*
***Mr. Forrest Smith,*** *Lead Petroleum and Environmental Engineer, National Park Service*
***Mr. Ron Krawczyk,*** *Senior Project Engineer, Parsons Corporation*
***Mr. Michael Hickey,*** *Program Engineer, Colorado Oil and Gas Conservation Commission*
***Mr. Brent Wilson,*** *Reclamation and Sustainability Manager, Red Willow Production Company*

**1:55pm** **Session 6: Advances in Plugging and Abandonment for Idle Wells**

***Moderator: Prof. Mileva Radonjic****, Professor & Samson Investment Chair in Petroleum Engineering*
***Dr. Susan Nash,*** *Director of Innovation and Emerging Science, American Association of Petroleum Geologists*
***Mr. Thomas Lopez,*** *Principal P&A, Exxon Mobil*
***Mr. Jesse Frederick,*** *Owner, WZI*
***Mr. Nick Gianoutsos,*** *Physical Scientist, Central Energy Resources Science Center, U.S. Geological Survey*
***Prof. Eric Van Oort,*** *Joe J. King Chair of Engineering No. 2 and B.J. Lancaster Professorship in Petroleum Engineering, The University of Texas at Austin*

**4:05pm** **Break**

**4:20pm** **Synthesis Remarks**

***Dr. Mary Feeley,*** *Chief Geoscientist, Exxon Mobil (retired)*
***Workshop staff leads,*** *National Academy of Sciences*

**4:30pm** **Next Steps and Future Work**

***Dr. Deborah Glickson,*** *Director, Board on Earth Sciences and Resources, National Academy of Sciences, Engineering, and Medicine*

**4:35pm** **MEETING AJOURNS**

# WORKSHOP OBJECTIVES

The National Academies will convene a workshop for DOI's Orphaned Wells Program Office to discuss existing practices and standards for plugging orphaned and abandoned hydrocarbon wells and will include discussion of:

- Historic and current well-plugging standards and design and operational practices used in the United States;
- How these standards and practices may differ based on factors such as well age, well depth, well location, material specification (e.g., casing, line, screening), geologic and geophysical environment, production type, distance to populated areas, and remediation and restoration requirements;
- Consideration of cost, technology, or other factors that impact the development of well-plugging plans; and
- Environmental benefits to well-plugging and/or mitigation of adverse environmental impacts from well-plugging (e.g., methane leakage mitigation, groundwater and surface water protection, surface reclamation, landscape/seascape degradation or restoration, and protection of animal and bird migration corridors).
- The workshop will include perspectives from the federal government, states, tribes, industry, and other stakeholders. The workshop will include a written proceedings.

# ROSTER:
## WORKSHOP PLANNING COMMITTEE, SPEAKERS, AND STAFF

## Workshop Planning Committee

**Mary H. Feeley**, Chief Geoscientist, Exxon Mobil (retired)

**Mary Kang**, Associate Professor, Department of Civil Engineering, McGill University

**D. Nathan Meehan**, Professor, Harold Vance Department of Petroleum

**Mileva Radonjic**, Professor & Samson Investment Chair in Petroleum Engineering

**James A. Slutz**, Director of Study Operations, National Petroleum Council

## Panelists

**David Alleman**, Director, Oil and Gas Research, US Department of Energy

**Dan Arthur**, President and Chief Engineer, ALL Consulting

**James Bolander**, President, JLB Engineering, LLC

**Susan L. Brantley**, Evan Pugh University Professor, Department of Geosciences Earth and Environmental Systems Institute, The Pennsylvania State University

**Sarah Busch**, General Engineer, Environmental Protection Agency

**James France**, Senior International Methane Scientist, Environmental Defense Fund

**Jesse Frederick**, Owner, WZI

**Nick Gianoutsos**, Physical Scientist, Central Energy Resources Science Center, U.S. Geological Survey

**Don Hegburg**, Program Manager, Office of Oil and Gas Management, Pennsylvania Department of Environmental Protection

**Michael Hickey**, Program Engineer, Colorado Oil and Gas Conservation Commission

**Drew Hunger**, President, Seashore Petroleum, LLC

**Ron Krawczyk**, Senior Project Engineer, Parsons Corporation

**Tom Kropatsch**, Oil and Gas Supervisor, Wyoming Oil and Gas Conservation Commission

**Greg Lackey**, Research Engineer, National Energy Technology Laboratory

**Thomas Lopez**, Principal P&A, Exxon Mobil

**Bryan McLellan**, Senior Petroleum Engineer, Alaska Oil and Gas Conservation Commission

**Susan Nash**, Director of Innovation and Emerging Science, American Association of Petroleum Geologists

**Adam Peltz**, Director and Senior Attorney, Energy Program, Environmental Defense Fund

**Steve Plants**, President of Abandonment Operations, Plants and Goodwin, Inc.

**James Saiers**, Clifton R. Musser Professor of Hydrology, School of the Environment, Yale University

**Rick Simmers**, Former Chief, Ohio Department of Natural Resources, Division of Oil and Gas Resources Management

**Forrest Smith**, Lead Petroleum and Environmental Engineer, National Park Service

**Danny Sorrells**, Deputy Executive Director and Director, Oil and Gas Division, Railroad Commission of Texas

**Eric Van Oort**, Joe J. King Chair of Engineering No. 2 and B.J. Lancaster Professorship in Petroleum Engineering, The University of Texas at Austin

**Brent Wilson**, Reclamation and Sustainability Manager, Red Willow Production Company

**Matthew Warren**, National Oil and Gas Program Lead, Bureau of Land Management

**Lori Wrotenbery**, Executive Director, Interstate Oil and Gas Compact Commission

## Staff

**Noel Walters**, Study Director, Associate Program Officer, Board on Earth Sciences and Resources

**Cameron Oskvig**, Board Director, Board on Infrastructure and the Constructed Environment

**Deborah Glickson**, Board Director, Board on Earth Sciences and Resources

**Samuel Kraft**, Senior Program Assistant, Board on Earth Sciences and Resources

**Miles Lansing**, Senior Program Assistant, Board on Earth Sciences and Resources

**Evan Elwell**, Research Associate, Board on Infrastructure and the Constructed Environment

# BIOGRAPHIES:
## WORKSHOP PLANNING COMMITTEE AND SPEAKERS

## Workshop Planning Committee

**Mary H. Feeley,** Chair, retired as Chief Geoscientist from ExxonMobil Exploration Company in 2014. Her responsibilities included advising senior ExxonMobil Upstream management on strategic geoscience matters and identifying global geoscience opportunities for ExxonMobil. Her graduate work focused on understanding depositional patterns in upper slope salt basins and the Mississippi Fan using seismic stratigraphy techniques. She also spent many years working on lease sales, prospect maturation, and energy development in the Gulf of Mexico. Feeley received a Ph.D. in oceanography from Texas A&M University. She previously served on the National Academies of Sciences, Engineering, and Medicine's Ocean Studies Board, the Committee on Guidance for NSF on National Ocean Science Research Priorities: Decadal Survey of Ocean Sciences, and the Committee on Offshore Science and Assessment for BOEM.

**Mary Kang** is an Associate Professor in Civil Engineering at McGill University, studying methane emissions from oil and gas systems and subsurface hydrology. Kang made the first direct measurements of methane emissions from abandoned oil and gas wells in the United States, and over the past decade, she has led projects on direct measurements of abandoned/inactive wells in Pennsylvania, West Virginia, Oklahoma, California, British Columbia, Alberta, Saskatchewan, Ontario, and internationally and conducts data mining, geospatial/statistical analysis, and machine learning to determine the scope of the emissions and develop mitigation solutions. Kang received a B.A.Sc. and M.A.Sc. in civil and environmental engineering at the University of Waterloo, Canada, a Ph.D. in civil and environmental engineering from Princeton University and was a postdoctoral fellow in Earth system science at Stanford University.

**D. Nathan Meehan** is a Professor in the Harold Vance Department of Petroleum Engineering at Texas A&M University, specializes in carbon capture, utilization, and storage, blue hydrogen, emissions reduction in oil and gas operations, and enhanced recovery in unconventional wells using carbon dioxide. He serves as a Senior Technology Advisor for Petro.ai and as a non-executive Director of Ignis H2, a geothermal energy startup. With over 45 years of industry experience, he held leadership roles at CMG Petroleum Consulting, Gaffney, Cline & Associates, and Baker Hughes. Meehan served as the 2016 President of the Society of Petroleum Engineers (SPE), is a Member of the National Academy of Engineering, and a recipient of SPE's Lester C. Uren Award, the Degolyer Distinguished Service Medal, and the SPE Public Service Award. He received the World Oil Lifetime Achievement Award and Petroleum Economist magazine's Legacy Award. Meehan received a B.Sc. in physics from the Georgia Institute of Technology, an M.Sc. in petroleum engineering from the University of Oklahoma, and a Ph.D. in petroleum engineering from Stanford University.

**Mileva Radonjic** is a Professor & Samson Investment Chair in Petroleum Engineering at Oklahoma State University where she established Hydraulic Barrier Materials and Geomimicry Labs, in the School of Chemical Engineering. She spent a year at the Federation of American

Scientists in Washington, DC, focusing on building materials for rapid rebuilding post-Katrina in New Orleans, prior to employment with BP America drilling team in Houston. Her primary research interest remains focused on investigating mechanisms of rock/cement-fluid interactions and their impact on engineering performance, in concrete structures, ancient monuments, and wellbores. Radonjic received a doctoral degree at the Interface Analysis Center, the University of Bristol, United Kingdom, followed by a visiting scholarship at Princeton University.

**James A. Slutz** is the Director of Study Operations for the National Petroleum Council (NPC), an independent federal advisory committee to the United States, reporting to the Secretary of Energy. Prior to NPC, he led a global energy consulting practice with projects in North America, Asia, and Europe. Previously, Slutz served as Acting Assistant Secretary of Fossil Energy at the United States Department of Energy (DOE) and before that as Deputy Assistant Secretary of Oil and Natural Gas. Prior to joining DOE, Jim served as the Indiana Oil and Gas Director, regulating the State's upstream oil and gas industry and natural gas storage wells. He is a former Vice-Chair of the Interstate Oil and Gas Compact Commission. Jim serves as an advisor to the National Bureau of Asia Research and is a Board Member of the local chapter of the Society of Petroleum Engineers (SPE). In his capacity with SPE, he serves as the program chair for the annual SPE/American Association of Petroleum Geologists/SEG Washington, DC Technology and Sustainability Symposium. He has published papers in collaboration with the American Enterprise Institute, The East West Center, the U.S. Chamber of Commerce Foundation, and the National Bureau of Asia Research. Slutz received a B.S. from The Ohio State University School of Natural Resources and an MBA degree from The Ohio State University, Fisher College of Business. He previously served as chair of the Committee on Earth Resources and as a member of the Board of Earth Sciences and Resources of the National Academies of Sciences, Engineering, and Medicine.

## Panelists

**David Alleman,** Director, Oil and Gas Research, US Department of Energy

**Dan Arthur** is the Founder, President and Chief Engineer of ALL Consulting and has served as its President & Chief Engineer throughout the firm's 25-year history. Dan also serves as the Vice President of Well Plugging Initiatives for CSR Services, Chief Technology Officers for True Methane Technologies and Carbon Offset Solutions, Vice President of Engineering for DynaVert Holdings, and Vice President of Sustainability for Verdant Technologies. He is a registered Professional Engineer in 35 states, a Certified Petroleum Geologists through AAPG, Registered Professional Petroleum Engineer through SPE, a Fellow of the Geological Society, and a Qualified Measurement Specialist. With over 40 years' experience, Dan has completed projects throughout the United States and in 30 different countries outside of the US (e.g., New Zealand, China, Saudi Arabia, South Africa, Albania, Oman, etc.). He earned a Bachelor of Science Degree in Petroleum Engineering from the Missouri University of Science & Technology.

**James Bolander** is President of JLB Engineering LLC, an engineering consulting firm. Bolander and has over 40 years of experience in the oil and gas industry. He most recently has

consulted with Environmental Defense Fund on wellbore integrity regulatory standards, and plug and abandonment standards from a state and federal perspective. He has also consulted with the New Mexico Oil Conservation Division in drafting new regulations on natural gas waste, for the Mitchell Foundation's Respect Big Bend Project, Technical Advisor at Independent Energy Standards Corp, and with Southwestern Energy on special projects such as methane emission mitigation and freshwater neutral. James was also on the Technical Advisory Board for Project Canary's TrustWell evaluation tool. Prior to forming JLB Engineering LLC, he retired from Southwestern Energy (SWN) as Senior Vice President of Resource Development with expertise in Operations, HS&E and project management. Before SWN, he spent 15 years with Mitchell Energy as an engineer working multiple disciplines (Drilling, Production and Reservoir Engineering) and geographic areas including operations in Texas, Mississippi, Louisiana and New Mexico. James has a Bachelor of Science in Petroleum Engineering from Louisiana State University.

**Susan L. Brantley** is Evan Pugh University Professor and Barnes Professor of Geosciences at the Pennsylvania State University. Brantley investigates chemical, biological, and physical processes associated with the circulation of aqueous fluids in shallow hydrogeologic settings. She is particularly interested in the critical zone – the zone from the top of vegetation canopy to groundwater. Investigations incorporate field and laboratory work, and theoretical modelling of observations. Of particular interest are questions concerning the measurement and prediction of the rates of natural processes, including chemical weathering with and without micro-organisms. Recent work has focused on the effect of microbial life on mineral reactivity, and measuring and modelling how rock turns into regolith.

**Sarah Busch** is a General Engineer in EPA's Office of Atmospheric Protection. Sarah works on multiple elements of the Inflation Reduction Act's Methane Emissions Reduction Program, including the Waste Emissions Charge rule, the Greenhouse Gas Reporting Program's subpart W, and EPA's partnership with the Department of Energy and the National Energy Technology Laboratory on financial and technical assistance. Sarah is a licensed professional engineer.

**Kimbra Davis** serves as the first Director of the newly established Orphaned Wells Program Office (OWPO) with the Department of the Interior (DOI). Within DOI, Ms. Davis has held several senior executive positions including as a Senior Advisor for the Bureau of Land Management (BLM) and as the former Director for the Office of Natural Resources Revenue. Kimbra started her federal service career in 2003 with the Department of Transportation's Office of Pipeline Safety. Before joining federal service, she worked for a major integrated oil and gas company in refining operations and as a "pipeliner". Kimbra holds a Bachelor of Science degree in Chemical Engineering from Oklahoma State University, an MBA from the University of Denver, a Graduate Diploma in International Development from the London School of Economics and is a Senior Executive Fellow graduate of Harvard University.

**James France** is a Senior International Methane Scientist working in the Office of Chief

Scientist for Environmental Defense Fund Europe. He has been with EDFE for 2 years and is primarily focused on methane quantification from a range of anthropogenic sources around the world. He is based in West London, UK and splits his time between EDFE and Royal Holloway University where he holds a Senior Research Fellow Position. France obtained a MSci. in Geosciences, and a Ph.D. in Snowpack Chemistry, both from the Royal Holloway University. He has 15 years of post-doctoral research experience and has published approximately 70 peer-reviewed papers.

**Jesse Frederick** is the Owner of WZI. Prior to coming to WZI, Mr. Frederick was Manager of Environmental Affairs for DESTEC. Mr. Frederick managed the day-to-day activities of the Environmental Affairs staff and oversaw all environmentally related issues including: property sales and acquisitions, SEC filing issues, permitting, compliance, and facility/property audits for all DESTEC facilities including 740,000 acres of oil and gas properties, including water treatment, waste water disposal, and superfund sites. Frederick's Role at WZI includes being responsible for the technical scoping of large projects which require multidisciplinary integration. Responsible for technical peer review of ongoing projects. Mr. Frederick acting on behalf of major clients has performed internal energy studies for long-term purchase and production plans as well as negotiated major energy contracts. In overseeing client regulatory compliance, Mr. Frederick advises clients regarding approaches to permitting and regulatory guidelines, including facilitating the Department of Energy's sale of the Elk Hills Naval Petroleum Reserve. Directs the planning, development and implementation of policies, programs and procedures in support of contract management. Mr. Frederick provides assistance in WZI's National Petroleum Council activities. Mr. Frederick is responsible for identifying business opportunities, expert advice on equipment design and procurement, energy forecasts, valuations, business planning and provides business development services to numerous clients.

**Nick Gianoutsos** leads the USGS Orphan Wells project in Denver, CO where he researches the lifecycle of orphan wells. Over the past 17 years he has conducted research on oil and gas assessments, water use associated with hydraulic fracturing, carbon sequestration, and previous experience working with remote sensing in NOAA and the National Park Service. He has a Masters degree in Computer Science from Texas Tech University and a Bachelors degree from West Texas A&M University.

**Don Hegburg** is a Program Manager and Professional Geologist for the Pennsylvania Department of Environmental Protection (DEP) Oil and Gas Program's Bureau of Planning and Program Management, Subsurface Activities and Well Plugging Division in the Central Office. Don has held this position since February 2023 and is responsible for the development of regulations, policy and guidance for subsurface activities associated with oil and gas development in Pennsylvania, including plugging. Don is the lead manager overseeing the preparation, submission and planning for oil and gas well plugging-related Federal awards available under the Infrastructure Investments and Jobs Act and Inflation Reduction Act. Don

previously served as Licensed Professional Geologist Manager for the DEP Oil and Gas Program, Southwest District Operations from 2020 to February 2023. While at the SW District, Don was responsible for orphaned well plugging projects funded by the Infrastructure Investments and Jobs Act, oversight of stray gas incidents, water supply complaints, and environmental cleanup activities. Don also served as a Licensed Professional Geologist with the DEP Land Recycling Program in the Northwest Region from 1990 to 2020 and was involved with the development of multiple environmental investigation and remediation guidance and has extensive experience overseeing numerous environmental incidents at upstream, midstream and downstream facilities. Don earned an associate degree in Petroleum Technology and a bachelor's degree in Geology from the University of Pittsburgh.

**Michael Hickey**, Program Engineer, Colorado Oil and Gas Conservation Commission

**Drew Hunger** is a recognized oil & gas industry decommissioning specialist. Hunger removed his first offshore platform while with Amoco in 1993 to reuse it for a new development. He was the Gulf of Mexico Plugging and Abandonment Manager and Decommissioning Manager at BP from 2002 through 2008. He was the Gulf of Mexico Decommissioning Manager at Apache Corporation from 2009 through 2013. During those periods, he and his teams plugged over 1200 wells and reefed or removed over 250 platforms. The wells included vertical, deviated, horizontal, H2S, HPHT, and subsea. He and his teams managed the decommissioning of hurricane damaged wells and platforms, including one platform that was completely burned out. He has had to re-enter leaking plugged and abandoned wells and continues to focus on why the leaks occur. Drew also worked to preserve and expand the rigs-to-reefs program in the Gulf of Mexico. Prior to being chosen to lead decommissioning, he had an extensive technical background in production operations, well intervention, facility construction and operations, and midstream (NGL plants, CO2 plants, pipelines, & compression). Hunger continues to work as a consultant decommissioning project manager and expert witness.

**Ron Krawczyk** is the Senior Project Engineer/Orphan Well Technical Director – Ron has a Bachelor of Science degree in Mechanical Engineering from Saginaw Valley State University coupled with nearly 20 years of experience solving orphan and legacy well issues involving remote well bore detection, re-plugging operations, and environmental remediation. His experience includes well site and abandonment engineering, receptor risk and integrity analysis, permitting, reporting, quantifying methane emissions, and program management of large-scale well abandonment projects.

**Tom Kropatsch** is a Supervisor of the Wyoming Oil and Gas Conservation Commission. Kropatsch has been with the Wyoming Oil and Gas Conservation Commission (WOGCC) since 2010 and served as a Natural Resources Analyst, the Natural Resources Supervisor, and Deputy Oil and Gas Supervisor. In 2021, he was appointed the State Oil and Gas Supervisor. During his tenure at the WOGCC, Kropatsch has been responsible for the implementation of the agency's environmental programs such as baseline groundwater quality; remediation and disposal of oil

and gas related wastes; recycling, reuse, and disposal of flow back and produced water; spill and incident response; pit and seismic permitting; bonding and financial assurance; and the orphan well program. As the Natural Resources Supervisor, Tom was also the program director for the agency's Class II Underground Injection Control program. For the last several years Tom has been leading the replacement of the agency's legacy database through the development of a suite of integrated software products which assists state agencies in regulating, oversight and management of oil, gas and UIC facilities and activities. Prior to his time with the WOGCC, Tom spent approximately ten years working in the environmental consulting industry. A graduate of Oklahoma State University with a degree in Geology, Tom is a Wyoming registered Professional Geologist. Presently, he sits on the Wyoming Energy Authority board and is currently the Vice-Chair for the Interstate Oil and Gas Compact Commission.

**Greg Lackey** is a research engineer at the United States Department of Energy (US DOE) National Energy Technology Laboratory (NETL) in Pittsburgh, Pennsylvania. He received his B.S. in Environmental Systems Engineering from the Pennsylvania State University (2011) and an M.S. (2013) and Ph.D. (2017) in Civil and Environmental Engineering from the University of Colorado Boulder. Dr. Lackey has expertise in subsurface flow and transport modeling, data analytics, and risk assessment. He has dedicated his career to documenting the conditions of US oil and gas well infrastructure to better understand its associated environmental and human health risks. Dr. Lackey currently leads projects at NETL under the US DOE's Undocumented Orphaned Wells Research Program, Technical Assistance for the Methane Emissions Reduction Program, and Carbon Storage Advanced Research and Development Program. These efforts focus on characterizing the condition of orphaned wells, reducing emissions from marginally productive wells, and quantifying the risks that legacy wells pose to future subsurface energy projects. Outside work, Dr. Lackey is a husband and father of three amazing children. He is an avid runner and advocate for autism awareness.

**Thomas H Lopez** is the Principal Engineer for Plug and Abandonment at ExxonMobil. In this role, he provides guidance and technical support for P&A activity in all of ExxonMobil's domestic and international business units and stewards internal standards which are applied globally. Thomas has a bachelor's degree in Chemical Engineering from University of Tulsa and master's degree in Petroleum Engineering from University of Houston. He has worked in the petroleum industry for 26 years in various roles related to production engineering, completions, wellwork, and well integrity. Has worked assets across the globe in many various operating and regulatory environments including USA offshore GOM and onshore unconventional, Norwegian North Sea, offshore Newfoundland, deepwater West Africa, and South America.

**Bryan McLellan** is a senior petroleum engineer with the Alaska Oil and Gas Conservation Commission (AOGCC). He was responsible for implementing the Orphan Wells Program in the State of Alaska and is currently the Orphan Wells Program Manager. He worked for a major oil and gas company, BP, for 20+ years as a drilling, completions, interventions and well abandonment engineer in Alaska, Norway and Azerbaijan. He worked as a Well Abandonment

engineer for BP in Norway, planning complex well abandonments under stringent NORSOK plugging regulations. In his current role, he oversees permitting for a wide range of well abandonments across the State of Alaska, including Orphan Wells. Bryan has a BS in Chemical Engineering from the University of Michigan and is a registered Professional Petroleum Engineer in the State of Alaska.

**Susan Nash** has more than 20 years experience in developing energy reserves, new technology promotion and economic development, with a focus on accomplishing transformation using data analytics. She earned her bachelor's, master's, and Ph.D. at the University of Oklahoma.

**Eric van Oort Professor** is a Joe J. King Chair of Engineering No. 2 and B. J. Lancaster Professorship in Petroleum Engineering. Research Areas: Well construction, drilling automation & control, sensor design, big data analytics, complex well construction challenges, drilling-related rock mechanics, drilling fluids, and well abandonment & decommissioning. He earned an M.S. and a Ph.D. in chemical physics from the University of Amsterdam.

**Adam Peltz** is the Director and Senior Attorney of the Energy Program at the Environmental Defense Fund. In his role as a director and senior attorney in EDF's Energy Program, Adam focuses on oil, gas and carbon capture, utilization and sequestration regulation and policy, and serves as a public advocate on these issues. Adam is responsible for managing multi-stakeholder efforts concerning oil and gas development and CCUS to improve environmental outcomes through enhanced regulation and improved industry practices, especially concerning secure geological storage of carbon dioxide, and orphaned oil and gas wells. Adam started as a legal fellow with EDF in 2011, working on natural gas as well as international climate efforts. During law school, he studied international development and climate change law, and interned at the Legal Resources Centre in Ghana, the Overseas Private Investment Corporation in Washington, D.C., and with the Geneva, Switzerland-based carbon credit certifier the Gold Standard.

**Steve Plants**, President of Abandonment Operations, Plants and Goodwin, Inc.

**James Saiers** is a hydrologist. His recent research addresses drinking-water impacts of fossil-fuel development, natural carbon capture and carbon cycling within watersheds, and migration of contaminants through groundwater aquifers. This research relies on experimentation and mathematical modeling and is conducted in collaboration with geochemists, engineers, ecologists and epidemiologists. His overarching goal is to generate new observations and to develop predictive approaches that can be used to inform water-resource management approaches intended to safeguard freshwater, ecosystems, and public health.

**Rick Simmers** retired as the Chief for the Ohio Department of Natural Resource (ODNR), Division of Oil and Gas Resources Management (DOGRM). He spent 9 years leading DOGRM and another 25+ in various positions in ODNR. He obtained his master's degree in geology from the University of Akron.

**Forrest Smith** is the Lead Petroleum and Environmental Engineer for the National Park Service's Geologic Resources Division. He provides technical support and expertise relating to oil and gas operations, geothermal, and carbon sequestration for all units of the National Park System. Forrest has a bachelor's degree in Petroleum Engineering from Montana Technological University and an MBA from Oklahoma State University. He has worked in the oil and gas industry for 19 years in roles ranging from production, completions, plug & abandonment, and midstream operations.

**Danny Sorrells** is the Deputy Executive Director and Oil and Gas Director with the Railroad Commission of Texas (RRC). As Oil and Gas Director his responsibilities include compliance, permitting, inspection and plugging operations for all oil and gas wells in Texas. The RRC's plugging program works aggressively to protect the environment and communities around the state, as evidenced by the fact that the agency has exceeded well plugging targets set by the Texas Legislature for seven straight years. In 2022, under Mr. Sorrell's leadership, Texas became the first state in the nation to plug an abandoned oil and gas well using federal grants from the Infrastructure Investment and Jobs Act. Sorrells has worked in the oil & gas and energy industry for over forty-six years in Arkansas, Louisiana and Texas. Most of this time he was working for Dowell Schlumberger International Inc. and his expertise includes design and execution of cementing, hydraulic fracturing, acidizing, sand control, coiled tubing, water control, and related tools used in these treatments. He joined the RRC in October 2016 as the Oil and Gas District Director for districts 05/06 in Kilgore. Then in September 2018 he became the Oil and Gas Director. Sorrells holds a Bachelor of Science in geology from Louisiana Tech University's College of Engineering.

**Matthew Warren**, National Oil and Gas Program Lead, Bureau of Land Management

**Brent Wilson** is the Reclamation and Sustainability Manager at Red Willow Production Company. Brent oversees environmental impact reduction initiatives on Red Willow's operations in the San Juan basin, including emissions reduction programs and the plug and abandonment reclamation team. Brent has held several various positions in engineering and operations at Red Willow over his 8 years at the company. Previous to his work at Red Willow, Brent worked as a mechanical engineer for CH2M Hill where he was part of various projects across the Bakken and San Juan basins. Brent is a licensed Professional Engineer in the state of Colorado and holds a Bachelor's degree in Engineering Physics from Northern Arizona University.

**Lori Wrotenbery** is Executive Director of the Interstate Oil and Gas Compact Commission, a government organization of oil and gas producing states that champions the conservation and efficient recovery and storage of domestic oil and gas resources while protecting human health and safety and the environment. At IOGCC she serves the governors and regulators of 31 member states and seven associate member states. Her previous service to the states included leadership roles at the oil and gas regulatory agencies in Texas, New Mexico, and Oklahoma. She earned a

B.A. in Anthropology from Wellesley College, a B.S. in Geology from the University of Texas, and a J.D. from Harvard University.

# NATIONAL ACADEMY OF SCIENCES BUILDING ACCESS AND INFORMATION

**Address:**
2101 Constitution Ave. NW, Washington, DC 20418
Room 120

**Access:**
If you registered for in-person participation, please enter the building from either the main entrance in the front of the building (2101 Constitution Ave.) or secondary entrance located at 2100 C Street. Meeting attendees entering the building will need to show a photo ID to the Security Guard, who checks the ID against the registration. No signature needed. Attendees will be directed to the appropriate meeting room by the Security Guard.

A visitor guide about the buildings can be downloaded at:
http://www.cpnas.org/collections/visitor-guide.pdf

**Food and Drinks:**
Complimentary coffee, tea and water will be available throughout the day. Breakfast and lunch will be provided. For federal employees who may have ethics guidelines that prohibit accepting meals, please bring cash or a check to cover the cost.

There is no outside food or drink allowed in the auditorium.

Please note that there is not a full service cafeteria in the building. There is a small automated market in the lower west side of the building that serves drinks, snacks and premade food for a charge.

**Parking:**
Visitor parking is free and provided on a first come, first serve basis in designated spaces at the NAS Building in the surface parking area off 21st street. Pull up to the gate between C Street, NW and D Street, NW on 21st Street, NW and notify the guard you are there to attend a meeting. You may be asked to complete the information on the visitor parking tag. They will direct you.

Note: because of nearby construction 21st Steet, NW from Virginia Ave NW to Constitution Ave NW is one-way moving south. Enter 21st street from Virginia Ave.

If parking capacity is exceeded overflow is directed to public parking garages. The public parking facilities closest to the NAS Building are Colonial Parking (20th Street, NW, between E and F Streets) and Columbia Plaza (23rd and Virginia Avenue, NW).

Taxis are usually parked along 22nd street and available throughout the day.

**Wi-Fi:**
Free Wi-Fi is available throughout the Keck Center and the NAS Building. Open Connect to a network by opening the Wi-Fi. In the list of available wireless networks, choose the visitor network and click connect. Open a web browser and go to: http://www.nas.edu when the Login Page appears, click Access the Internet. No password is required.

# DIRECTIONS TO THE NATIONAL ACADEMY OF SCIENCES

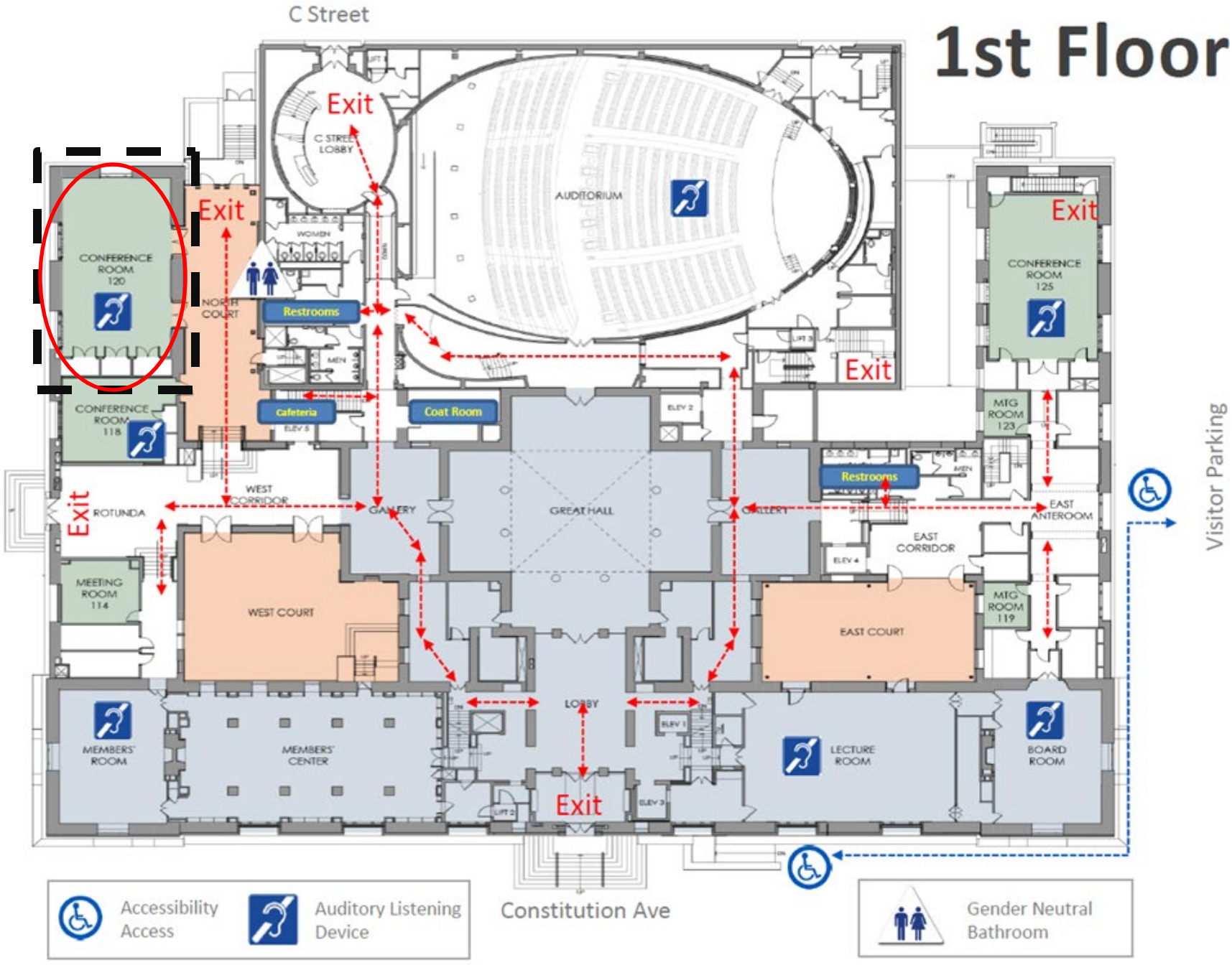
2101 Constitution Ave., NW, Washington DC

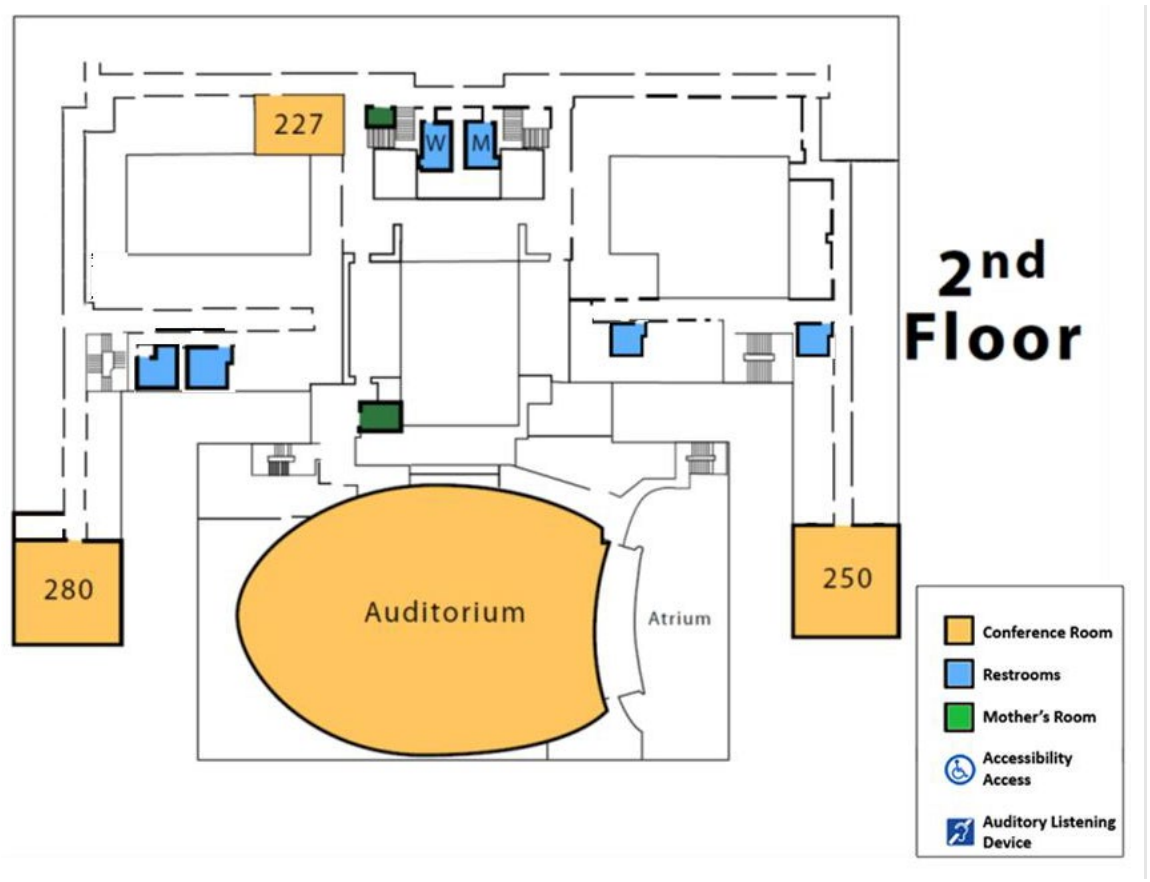
**By Car from Ronald Reagan National Airport:**
Take Airport Exit to George Washington Memorial Parkway North.
Take exit to Memorial Bridge.
Bear left after crossing Memorial Bridge.
Take second left onto Henry Bacon Drive, NW. You must turn left at this point as your route will be blocked by Jersey walls.
Take right at light onto Constitution Avenue, NW.
Take left at second light onto 21st NW.
Parking lot entrance is on left before stop sign at intersection with C Street, NW.

**By Car from Dulles International Airport:**
Take Airport Exit to Airport Access Road east.
Follow until Access Road merges with Rte 66 East.
Follow Rte 66 east into DC. Rte 66 becomes Rte 50 East / Constitution Avenue, NW.
Follow Route 66 to intersection of Constitution Avenue, NW and 23rd Street, NW.
Take left at third light following the intersection onto 21st NW.
Parking lot entrance is on left before stop sign at intersection with C Street, NW.

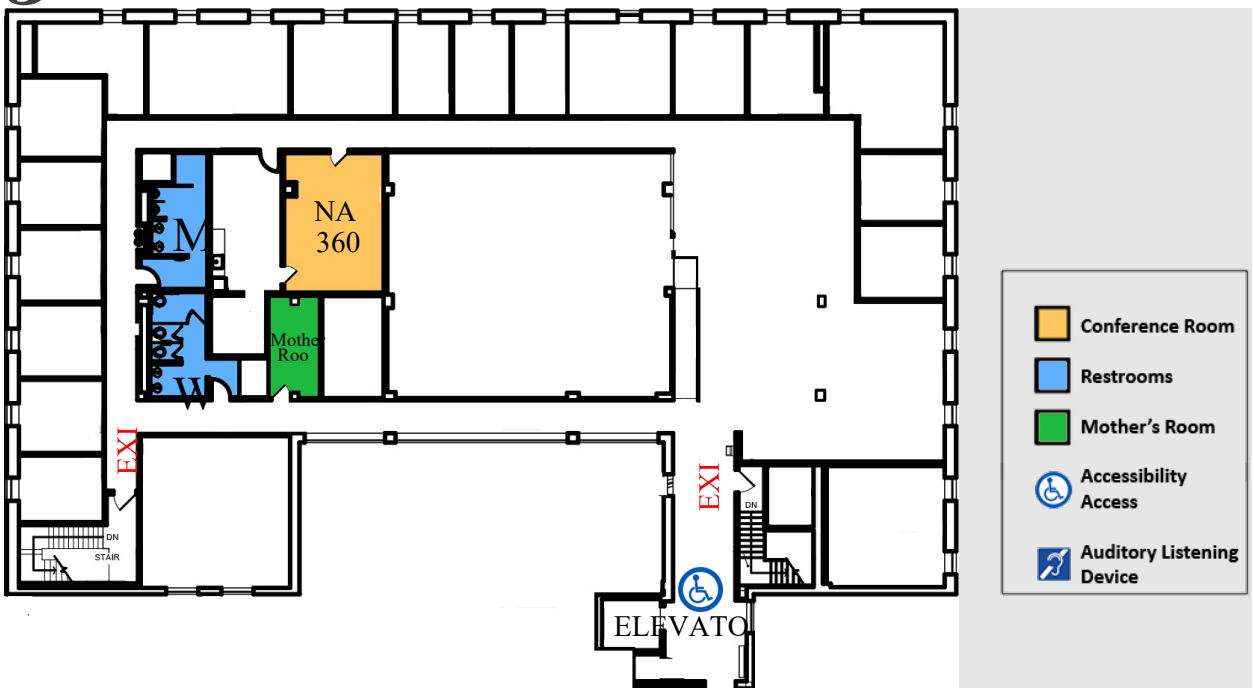
**By Metro:**
**0.7 miles**
Take the Orange or Blue Line to Foggy Bottom-GWU Metro stop.
Turn right when you exit the station.
Walk south down 23rd Street, NW for approximately 7 blocks.
Turn left onto C Street, NW (after the State Department).
Cross 22nd Street.

**1.1 miles**
Take the Red Line to Farragut North Metro Stop.
Head west on K St NW
Turn left onto 19th Street, NW for approximate 2 blocks
Turn right onto H Street, NW for approximately 2 blocks
Turn left onto 21st Street, NW for approximately 4 blocks
On the right after C Street, NW (after the State Department).


C Street
1st Floor
Exit
C STREET LOBBY
AUDITORIUM
Exit
CONFERENCE ROOM 120
NORTH COURT
WOMEN
Restrooms
MEN
Cafeteria
Coat Room
ELEV 5
ELEV 2
Exit
CONFERENCE ROOM 125
MTG ROOM 123
CONFERENCE ROOM 118
Exit
ROTUNDA
WEST CORRIDOR
GALLERY
GREAT HALL
GALLERY
Restrooms
EAST ANTEROOM
EAST CORRIDOR
ELEV 4
MEETING ROOM 114
WEST COURT
EAST COURT
MTG ROOM 119
Visitor Parking
MEMBERS' ROOM
MEMBERS' CENTER
LOBBY
ELEV 1
LECTURE ROOM
BOARD ROOM
LIFT 2
Exit
ELEV 3
Constitution Ave
Accessibility Access
Auditory Listening Device
Gender Neutral Bathroom


227
W
M
2nd Floor
280
Auditorium
Atrium
250
Conference Room
Restrooms
Mother's Room
Accessibility Access
Auditory Listening Device

# 3rd Floor


M
NA
360
W
Mother
Roo
EXI
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STAIR
EXI
DN
ELEVATO
Conference Room
Restrooms
Mother's Room
Accessibility Access
Auditory Listening Device

# NASEM Policy on Discrimination, Harassment, and Bullying for Participants in Academies Activities

**Preventing Discrimination, Harassment, and Bullying Expectations for Participants in National Academies Activities**

The National Academies of Sciences, Engineering, and Medicine (NASEM) are committed to the principles of diversity, integrity, civility, and respect in all of our activities. We look to you to be a partner in this commitment by helping us to maintain a professional and cordial environment. All forms of discrimination, harassment, and bullying are prohibited in any NASEM activity. This commitment applies to all participants in all settings and locations in which NASEM work and activities are conducted, including committee meetings, workshops, conferences, and other work and social functions where employees, volunteers, sponsors, vendors, or guests are present.

Discrimination is prejudicial treatment of individuals or groups of people based on their race, ethnicity, color, national origin, sex, sexual orientation, gender identity, age, religion, disability, veteran status, or any other characteristic protected by applicable laws. Sexual harassment is unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature that creates an intimidating, hostile, or offensive environment.

Other types of harassment include any verbal or physical conduct directed at individuals or groups of people because of their race, ethnicity, color, national origin, sex, sexual orientation, gender identity, age, religion, disability, veteran status, or any other characteristic protected by applicable laws, that creates an intimidating, hostile, or offensive environment. Bullying is unwelcome, aggressive behavior involving the use of influence, threat, intimidation, or coercion to dominate others in the professional environment.

**Reporting and Resolution**
Any violation of this policy should be reported. If you experience or witness discrimination, harassment, or bullying, you are encouraged to make your unease or disapproval known to the individual, if you are comfortable doing so. You are also urged to report any incident by:
Filing a complaint with the Office of Human Resources at 202 334 3400, or
Reporting the incident to an employee involved in the activity in which the member or volunteer is participating, who will then file a complaint with the Office of Human Resources.
Complaints should be filed as soon as possible after an incident. To ensure the prompt and thorough investigation of the complaint, the complainant should provide as much information as is possible, such as names, dates, locations, and steps taken. The Office of Human Resources will investigate the alleged violation in consultation with the Office of the General Counsel.
If an investigation results in a finding that an individual has committed a violation, NASEM will take the actions necessary to protect those involved in its activities from any future discrimination, harassment, or bullying, including in appropriate circumstances the removal of an individual from current NASEM activities and a ban on participation in future activities.

**Confidentiality**
Information contained in a complaint is kept confidential, and information is revealed only on a need-to-know basis. NASEM will not retaliate or tolerate retaliation against anyone who makes a good faith report of discrimination, harassment, or bullying.